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THE "ALKALI DISEASE" OF LIVESTOCK IN THE PECOS VALLEY

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A DISEASE known commonly as "alkali disease" or "milksickness" has caused many fatalities of domestic animals in certain localities in New Mexico, Texas, and Arizona.

The cause of the disease has not been definitely known. By some it has been considered of bacterial origin, while others have supposed it to be caused by poisonous plants.

The plant which has been most commonly thought to be connected with the disease is popularly known as "rayless goldenrod," the scientific name of which is *Isocoma wrightii*.

Experimental work has shown that the rayless goldenrod is poisonous to cattle, horses, and sheep, and produces a definite line of symptoms, corresponding to those considered characteristic of the "alkali disease," or "milksickness." It has been shown, also, that the symptoms follow the eating of the plant independently of any bacteria which may be upon it.

At the present stage of the investigation no specific medicinal treatment can be recommended for affected animals, but if livestock can be prevented from eating any considerable quantity of the plant and are removed to good pasture, they are likely to recover. It appears, also, that it is practicable, by digging, to destroy the plant in affected pastures.

THE "ALKALI DISEASE" OF LIVESTOCK IN THE PECOS VALLEY.

INTRODUCTORY STATEMENT.

A DISEASE of domestic animals popularly called the "alkali disease," or "milksickness," has been known for many years in the Pecos Valley of New Mexico and Texas, where it has caused heavy losses of cattle and horses in the pastures. The disease has seriously affected the dairy industry because of the rather general belief that it can be transmitted by milk and butter to young animals and human beings. In many cases, because of the fear of transmission of the disease, the sale of milk and butter has entirely stopped from certain localities.

The cause of the disease has not been known. Certain investigations by Jordan and Harris¹ led them to believe that it is of bacterial origin, and is identical with the milksickness of certain of the Eastern States. Many, however, have thought that the disease was connected with some plant or plants upon which the animals were fed. Very generally, suspicion has been thrown upon the plant commonly known as "rayless goldenrod," which is called by the botanists *Isocoma wrightii*. Scientific investigators have thought that possibly the disease was caused by bacteria which are found on this plant and produce the disease when the plant is eaten. The United States Department of Agriculture is engaged upon a detailed investigation to determine whether the plant itself is toxic. A detailed report can be published only after long and laborious experimental work. The poisonous character of the plant has been proved conclusively, however, by the results which have already been obtained, and it seems wise to issue a preliminary statement for the information of stockmen in the affected region.

The experiments on which this brief report is based were carried on at Roswell, N. Mex. These were supplemented by checking experiments conducted at the experiment station near Salina, Utah.

¹ Journal of Infectious Diseases, Vol. 6, pp. 401-491, September, 1909.

DESCRIPTION OF THE "RAYLESS GOLDENROD."

Following is a description of the plant from the botanist's standpoint, which may serve for identification:

Isocoma wrightii, with which *Isocoma heterophylla* is considered a synonym, is a stout perennial herb with suffruticose stems, commonly growing to a height of about 2 feet, but sometimes, under favorable circumstances, reaching a height of 4 feet or even more. The leaves are linear to oblanceolate, entire, or toothed. The heads are several to many flowered, numerous, corymbose, yellow-flowered. The involucre are turbinate or narrowly campanulate, the bracts thick, coriaceous, and appressed. The achenes are short and sericeous.



FIG. 1.—A plant after the ground was covered with snow.

Figures 1 and 2 show the general appearance of the plant as it is found in the Pecos Valley. It is most commonly known as the "rayless goldenrod," but sometimes is called "jimmy weed." The plant occurs in western Texas, New Mexico, and Arizona, and generally grows in an alkaline soil. It grows with great luxuriance on the banks of irrigation ditches, and in such locations it sometimes makes a thick hedge.

ANIMALS AFFECTED.

The experimental work has furnished conclusive evidence that horses, cattle, and sheep may be poisoned by this plant. There is good evidence also, from field work, that burros may be affected by it.

SYMPTOMS IN POISONED ANIMALS.

The first symptom noted is marked depression. The animals are inactive, appear stupid, usually stand humped up, and move with a stiff gait, this stiffness being especially marked in the forelegs.



FIG. 2.—*Isocoma wrightii* (rayless goldenrod), showing the plant late in the fall.

When the animal is made to move about, sometimes the forelegs give way, it comes down on its knees, and may even attempt to walk about in this posture. Figure 3 shows an animal in this condition. The inactivity increases and culminates in extreme weakness. In the latter stages the animal lies down most of the time, and eventually is unable to get on its feet. In figure 4 is shown an animal in this stage. Constipation occurs in all cases, but this condition may be preceded by a period of diarrhea. In the later stages the feces are not only hard but also bloody. Marked muscular trembling is present, and this may be considered as diagnostic of the disease; in fact, sometimes the disease is known as the "trembles." Exercise will bring on these periods of trembling more quickly, and in many cases the trembling is so marked that the animal presents an appearance of shivering.

The temperature remains normal during the illness, but as a rule it falls shortly before death.

The respiration in the sick animals, shortly before death, is very characteristic. It is labored, a prolonged inspiration being followed by a pause, and then a short and somewhat forcible expiration. In the later stages the animals breathe in a series of gasps.

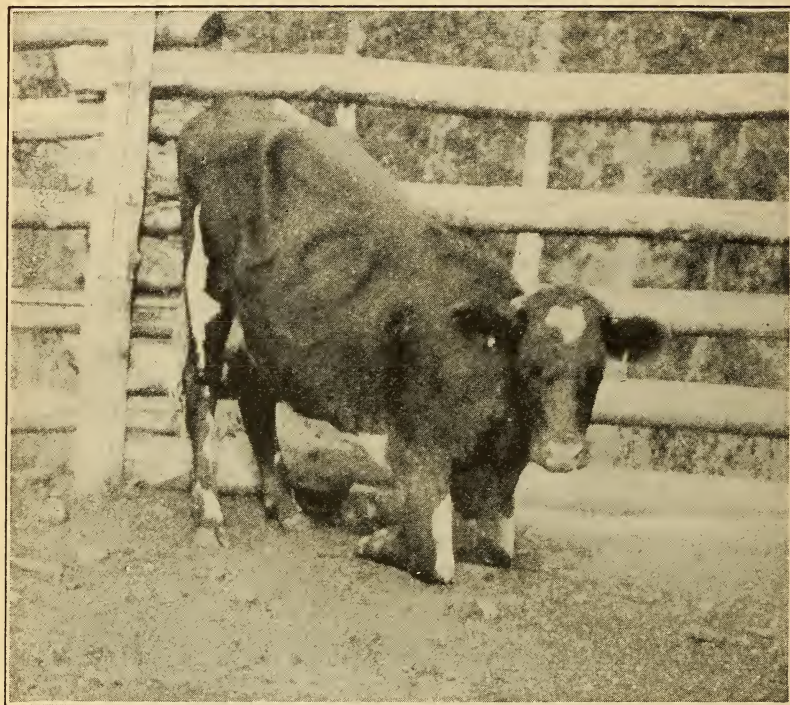


FIG. 3.—A steer in the early stages of the disease, showing weakness of forelegs.

Some of the animals kick about a little before death, but there are no violent struggles, and sometimes they die with no preceding movements.

The experiments conducted up to the present have not positively confirmed the popular belief that young animals taking the milk of adults which have eaten the plant contract the disease.

AUTOPSIES.

Few pronounced lesions were found in the autopsies of animals which died from the disease. The most marked of these was congestion in the alimentary canal, especially in the fourth stomach and the small intestine. This congestion in some cases was continued into the large intestine and the rectum.

TOXIC DOSE.

According to the experimental evidence which has been obtained it seems that an average daily feeding of $1\frac{1}{2}$ pounds of the green plant per 100 pounds of animal, continued for a week, may produce toxic symptoms or death. To put it in other words, an average sheep may be poisoned or killed by a daily feeding of $1\frac{1}{2}$ pounds continued for a week, or a 500-pound steer may be poisoned on a daily feeding of 7 to 8 pounds continued for the same period. This quantity could very easily be obtained by animals pastured on land where the plant is abundant and other forage is scarce.



FIG. 4.—Characteristic posture assumed in the last stages of the disease.

DIFFERENCE BETWEEN DRY AND GREEN PLANT.

It apparently is true that although the dry plant is toxic it is not so poisonous as the green plant. Considerably more of the dry plant, varying in quantity with the condition of the plant, must be eaten before harmful results will follow. There is some reason, too, for believing that the leaves are more toxic than the stems, so that during the winter months, after many of the leaves have fallen, much more of the plant would have to be eaten before poisoning would occur.

TREATMENT OF AFFECTED ANIMALS.

No definite line of medicinal treatment can be recommended for poisoned animals. A purgative like Epsom salt, administered to correct the condition of constipation, will probably be of real assistance, not only in restoring the normal functions of the intestines

but in aiding in the elimination of the poison. Without much doubt, however, reliance must in the main be placed on moving the animals so that they can get no more of the plant and can have an abundance of good feed. It is probable that oil cake or oil meal would be a desirable addition to their diet.

In the experimental work it was found that animals showing pronounced symptoms, if taken away from the plant and put on good pasture, commence to recover from the disease surprisingly soon. There seems to be every reason to think that if the animals are removed from the plant in the early stages of the disease and supplied with an abundance of good feed most of them will recover without any further treatment.

DESTRUCTION OF THE PLANT.

While *Isocoma* grows in great luxuriance in some places, it is not extremely difficult to dig it out of pastures. Mr. J. C. Camp, of Pecos, Tex., stated to the authors in the fall of 1919 that he cleaned a pasture seven years before, and not only has had no trouble with his livestock kept there since that time, but only a few plants have appeared. The plants were dug out to a depth of 2 or 3 inches. Similar testimony was obtained from persons living near Carlsbad, N. Mex.

No opportunity has been presented to perform experimental work in eradication, but it seems probable from the evidence obtained that not only is eradication from pastures practically possible, but also that it is the best way of combating the trouble.

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